

WHAT IS CLAIMED IS:

1. A transmission diffraction grating body comprising:  
a base material being substantially transparent with respect to  
5 wavelength  $\lambda_1$  and having a refractive index  $n_0$ ;  
another base material being substantially transparent with respect to  
wavelength  $\lambda_1$  and having a refractive index  $n_1$ , which is formed on the base  
material having a refractive index  $n_0$ ; and  
a relief diffraction grating formed on the base material having a  
10 refractive index  $n_1$ ; wherein:  
the refractive indexes  $n_1$  and  $n_0$  satisfy the following relationship:  
$$n_1 > n_0.$$
2. The diffraction grating body according to claim 1, wherein the  
15 diffraction grating is formed of a concave portion and a convex portion having  
rectangular-shaped cross sections, and the level difference  $h$  between the  
concave portion and the convex portion satisfies the following relationship:  
$$h = \lambda_1 / (n_1 - 1)$$
- 20 and the difference in an optical path between the concave portion and the  
convex portion is set to correspond to one wavelength with respect to the  
wavelength  $\lambda_1$ .
- 25 3. The diffraction grating body according to claim 1, wherein the  
refractive index  $n_1$  is 1.9 or more.
- 30 4. The diffraction grating body according to claim 1, wherein a material  
of the base material having the refractive index  $n_1$  is at least one material  
selected from the group consisting of  $Ta_2O_5$ ,  $TiO_2$ ,  $ZrO_2$ ,  $Nb_2O_3$ ,  $ZnS$ ,  $LiNbO_3$   
and  $LiTaO_3$ .
- 35 5. The diffraction grating body according to claim 1, wherein the  
diffraction grating is formed of a concave portion and a convex portion having  
rectangular-shaped cross sections, and the film thickness of the base material  
having the refractive index  $n_1$  is the same as the level difference  $h$  between  
the concave portion and the convex portion.

6. The diffraction grating body according to claim 1, further comprising  
an anti-reflection film in the interface between the base material having a  
refractive index  $n_1$  and the air, and the interface between the base material  
5 having the refractive index  $n_1$  and the base material having a refractive index  
 $n_0$ .

7. A transmission diffraction grating body, comprising a base material,  
and a relief diffraction grating formed on the base material, wherein the  
10 diffraction grating body is formed of a single base material; and the refractive  
index  $n_1$  of the single base material is 1.9 or more.

8. The diffraction grating body according to claim 7, wherein the  
diffraction grating is formed of a concave portion and a convex portion having  
15 rectangular-shaped cross sections, and the level difference  $h$  between the  
concave portion and the convex portion satisfies the following relationship:

$$h = \lambda_1 / (n_1 - 1)$$

20 and the difference in an optical path between the concave portion and the  
convex portion is set to correspond to one wavelength with respect to the  
wavelength  $\lambda_1$ .

9. The diffraction grating body according to claim 7, wherein a material  
25 of the single base material is at least one material selected from the group  
consisting of  $Ta_2O_5$ ,  $TiO_2$ ,  $ZrO_2$ ,  $Nb_2O_3$ ,  $ZnS$ ,  $LiNbO_3$  and  $LiTaO_3$ .

10. A semiconductor laser apparatus provided with a diffraction grating  
body according to any one of claims 1 to 9, comprising:

30 a semiconductor laser for emitting a light beam with wavelength  $\lambda_1$   
and a light beam with wavelength  $\lambda_2$ ; and

a photodetector for receiving the light beams emitted from the  
semiconductor laser and carrying out photoelectric conversion; wherein:  
the diffraction grating body receives the light beam with wavelength  
35  $\lambda_2$  and transmits a main beam and generates sub-beams that are ±first  
order diffracted light; and

the diffraction grating body, the semiconductor laser and the

photodetector are integrated into one package.

11. An optical pick-up provided with a diffraction grating body according to any one of claims 1 to 9, comprising:

5            a first semiconductor laser light source for emitting a light beam with wavelength  $\lambda_1$ ;

              a second semiconductor laser light source for emitting a light beam with wavelength  $\lambda_1$ ;

10          an optical system for receiving the light beam with wavelength  $\lambda_1$  and the light beam with wavelength  $\lambda_2$  and converging the light beam onto a microspot on the optical disk;

              a diffraction means for diffracting a light beam reflected from the optical disk; and

15          a photodetector having a photo detecting portion for receiving the diffracted light diffracted by the diffraction means to output electrical signals in accordance with the amount of the diffracted light; wherein

              the diffraction grating body receives the light beam with wavelength  $\lambda_2$  and transmits a main beam and generates sub-beams that are  $\pm$ first order diffracted light.

20          12. The optical pick-up according to claim 11, wherein the photo detecting portion comprises a photo detecting portion PD0 for receiving a +first order diffracted light from the diffraction means, and a distance d1 between the center of the photo detecting portion PD0 and the light emitting spot of the first semiconductor laser light source and a distance d2 between the center of the photo detecting portion PD0 and the light emitting spot of the second semiconductor laser light source substantially satisfy the following relationship:

30            
$$\lambda_1 / \lambda_2 = d1/d2.$$

35          13. The optical pick-up according to claim 11, wherein the diffraction grating body, the semiconductor laser and the photodetector are integrated into one package.

14. An optical information apparatus provided with the optical pick-up according to claim 11, comprising: